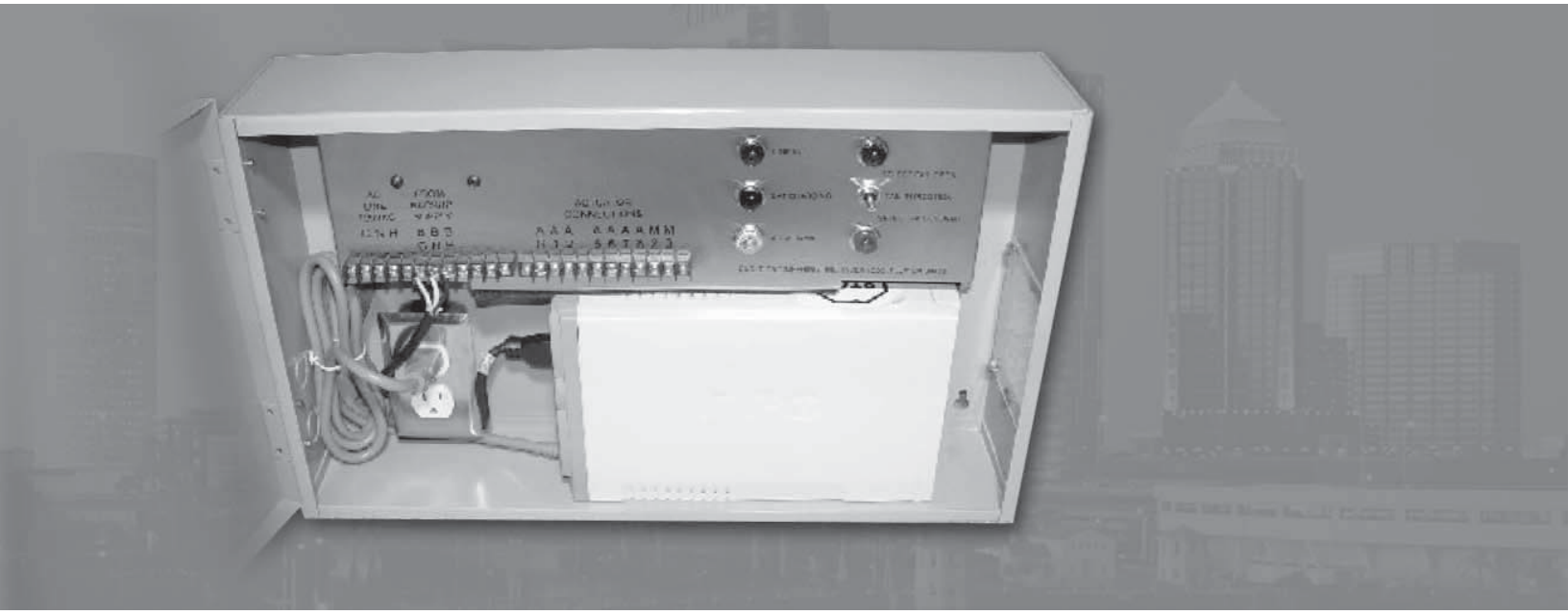
70677-00001C

# NSV-SY
# Battery Back-Up System



- Provides Fail-Safe Operation for SY Series Industrial Electric Actuators, SY1 through SY12.
- Field Selectable Fail Direction
- Readily Available Sealed Lead-Acid Battery Packs
- Provides 500% of Power Requirements for Full Load Cycle
- Key Lock Hinged Front Steel Controls Enclosure

BELIMO®

# NSV-SY Battery Back-Up System
# For Belimo SY Series Electric Actuators, 2 Position or Modulating

- **Provides Fail-Safe Operation for SY Series Industrial Electric Actuators, SY1 through SY12.**
- **Field Selectable Fail Direction**
- **Readily Available Sealed Lead-Acid Battery Packs**
- **Provides 500% of Power Requirements for Full Load Cycle**
- **Key Lock Hinged Front Steel Controls Enclosure**

## Application

Typically, applications requiring fail-safe operation of actuated devices have had to rely on either the limited power of mechanical spring return actuators, or use costly high pressure pneumatic devices to provide fail-safe positioning. Model NSV series computer-grade UPS back-up systems designed for use with SY Series electric industrial quarter-turn actuators provides the power necessary to drive these actuators to a field selectable fail-safe position. The system consists of a painted steel key lock hinged door controls cabinet which houses the logic switching, all field wiring terminal points and a computer-grade back-up system. The back-up system is a component-level device which utilizes a replaceable spill-proof battery pack that can be readily purchased at most office-supply centers.

## Safety in Numbers

The system is designed to provide at a minimum up to 500% of the power required to drive the various actuators through their full 90 degree rotation at full running amperage draws. However, when the actuators have reached their field-selectable end-of-travel positions, current draw drops to zero and the back-up system sits idle until either the time-out function integral to the battery is reached or the mains power returns, whichever occurs first.

## Simple User Interface

Indicator lights visible through the viewport on the front and side of the control cabinet give status indication of mains power, back-up system charging and fail-safe operation. The NSV series is powered from building power and all power and logic interface wiring passes through the control cabinet. There are two different series produced, one is used for actuators which operate under 2 position or on/off control schemes, while the second series is used for actuators operating under proportional control schemes. Various models are available within these two series to provide the most cost effective and efficient means of providing fail-safe operation for these actuators.

**NOTE: Universal Power Supply must be removed from cabinet to access the battery. Battery must be connected to the wire harness to activate the Universal Power Supply.**

**NOTE: Universal Power Supply must be turned on to charge the battery.**

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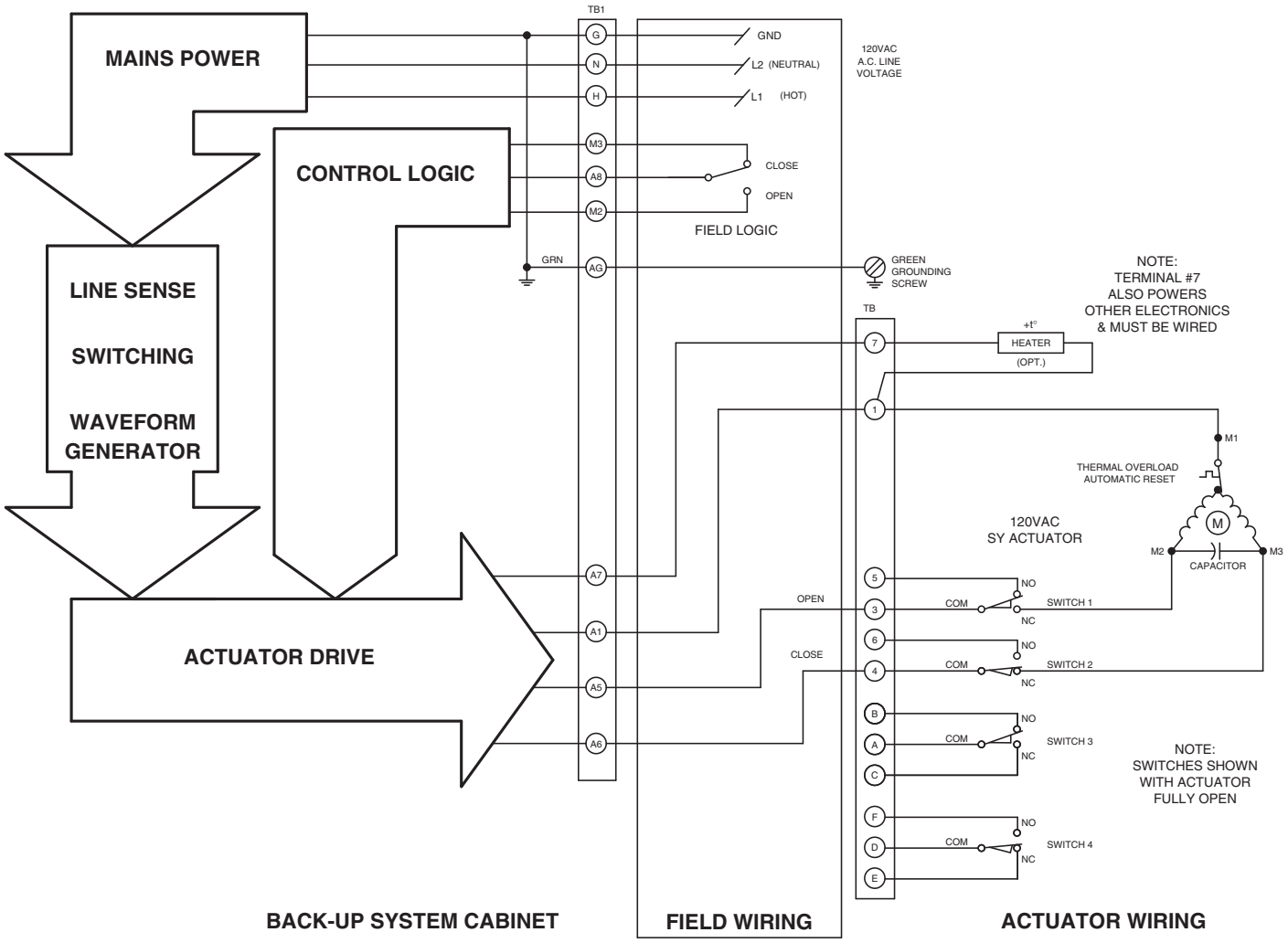


## Sequence of Operation - 2 Position Control

The back up system is wired in series between the mains power and the actuator. Under normal operation, power supplied to TB1 H & N terminals will illuminate the green “LINE IN” indicator light and provide charging voltage to the battery system. While under mains power, the field select switch (or form A contacts) are enabled to control the positioning of the actuator. The end user can install a center-off switch for 3 point floating control, a SPDT toggle switch for 2 position control, or interface through an automation system’s form A contacts. Any method of operation will not affect the back up unit’s operation. While under mains power, the blue “BAT CHARGING” indicator light is illuminated while the yellow “B/U POWER” indicator light remains off. While under mains power, the position of the “FAIL POSITION SELECT” switch is irrelevant. Power is supplied through the interface cabinet and the actuator heater is enabled. No current is being drawn from the battery system during this mode of operation.

When the mains power is lost, charging power is no longer supplied to the battery system, and the green “LINE IN” indicator light is turned off. The battery system automatically generates modified-sine wave line voltage to provide power for the actuator. The blue “BAT CHARGING” indicator light is turned off, and the yellow “B/U POWER” indicator light is turned on. The “FAIL POSITION SELECT” switch becomes active, and depending on its position, drives the actuator either fully open or fully closed. During this mode of operation, the heater is NOT energized, and the position of any field interface switching is irrelevant. The battery system will provide ample power to drive the actuator more than 5 full torque cycles. However, once the actuator reaches its end-of-travel limit switch, power drain from the back-up system is reduced to the requirements of the yellow “B/U POWER” indicator light. After 15 minutes, the battery system turns itself off and waits for the mains power to return. The gear train design of the SY actuator provides automatic locking of the actuator position after the battery system shuts down. Normal operation is resumed when mains power returns.

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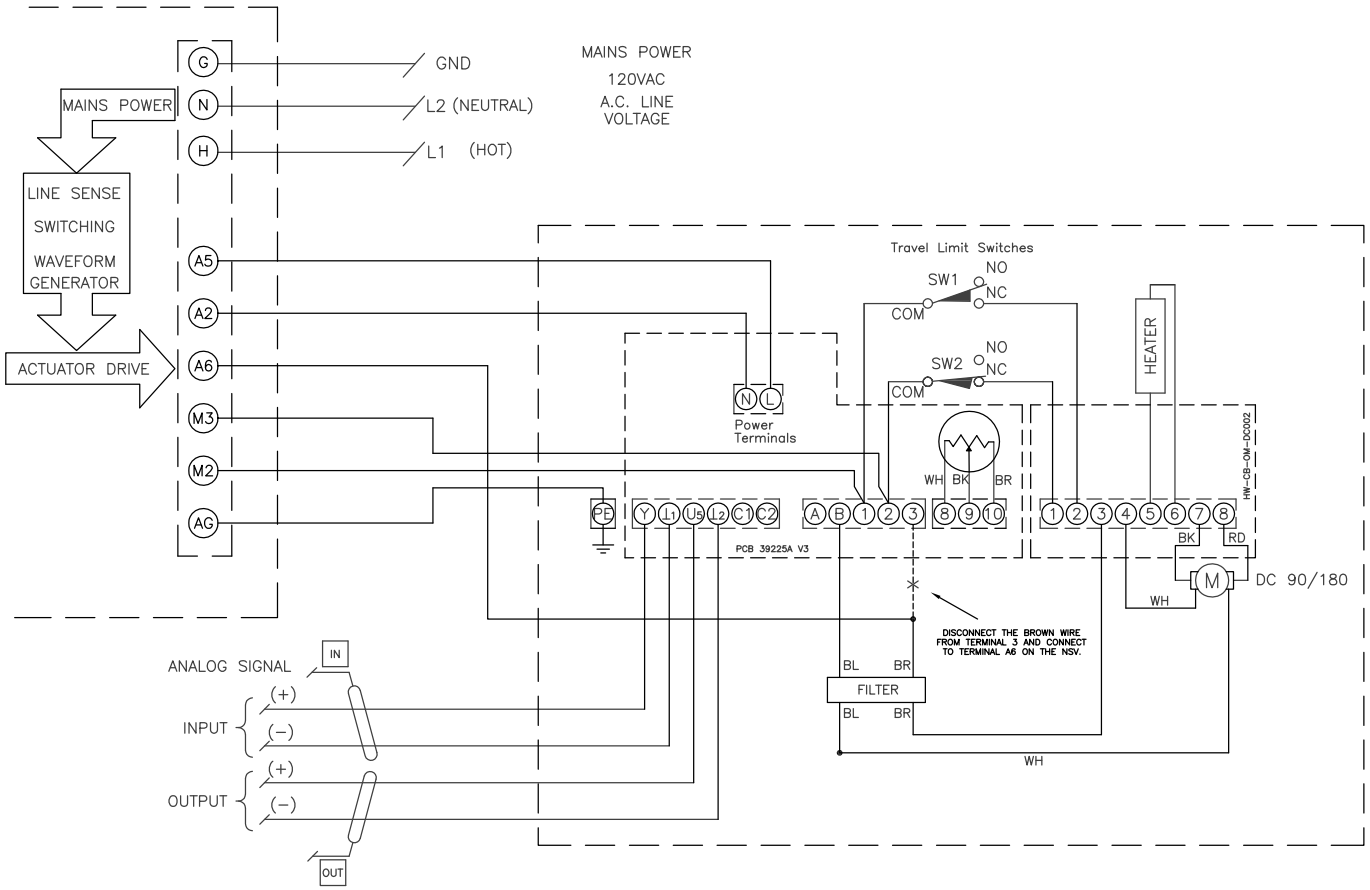
# NSV-SY Battery Back-Up System
# For Belimo SY Series Electric Actuators, 2 Position or Modulating




## Sequence of Operation - Modulating Control

Note: This Model requires modification to SY-MFT Model interface wiring inside the SY actuator.

The back up system is wired in series between the mains power and the actuator. Under normal operation, power supplied to TB1 H & N terminals will illuminate the green “LINE IN” indicator light and provide charging voltage to the battery system. While mains power is present, the SY drive logic interface card is enabled and provides proportional positioning of the SY actuator in response to incoming signals from customer supplied field automation devices. While under mains power, the blue “BAT CHARGING” indicator light is illuminated while the yellow “B/U POWER” indicator light remains off. While under mains power, the position of the “FAIL POSITION SELECT” switch is irrelevant. Power is supplied through the interface cabinet and the actuator heater is enabled. All internal actuator controls are otherwise not affected by the backup system. All movement of the actuator is controlled by the automation control system. No current is being drawn from the battery system during this mode of operation.

When the mains power is lost, charging power is no longer supplied to the battery system, and the green “LINE IN” indicator light is turned off. The battery system automatically generates modified-sine wave line voltage to provide power for the actuator. The blue “BAT CHARGING” indicator light is turned off, and the yellow “B/U POWER” indicator light is turned on. The “FAIL POSITION SELECT” switch becomes active, and depending on its position, drives the actuator either fully open or fully closed. During this mode of operation the incoming proportional signal is irrelevant. The battery system will provide ample power to drive the actuator more than 5 full torque cycles. However, once the actuator reaches its end-of-travel limit switch, power drain from the back-up system is reduced to the requirements of the yellow “B/U POWER” indicator light. After 15 minutes, the battery system turns itself off and waits for the mains power to return. The gear train design of the SY actuator provides automatic locking of the actuator position after the battery system shuts down. Normal operation is resumed when mains power returns.

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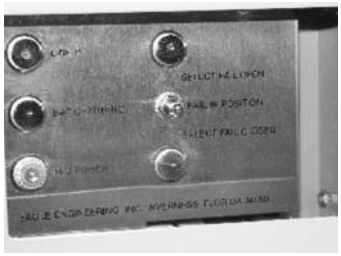
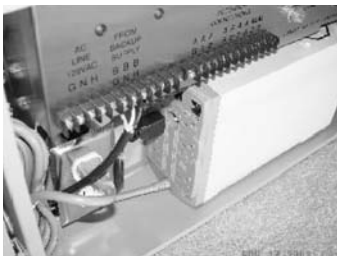
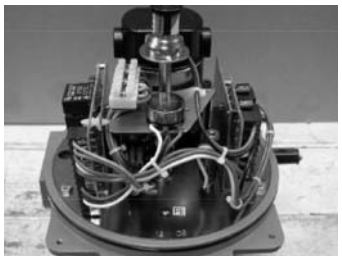


Key Access and Status Viewports

Battery System Status Indicators



All Connections to APC Backup are Modular



Connection to PCB Interface

## SIZING AND PERFORMANCE CHART

| Actuator Model | Torque Output | Runtime (secs) | Draw (amps) | 2 Position Model | Modulating Model | Runtime at 50% Capacity (minutes) | % Capacity Used at Full Runtime | Replacement Battery |
|---|---|---|---|---|---|---|---|---|
| SY1-110(P) | 310 | 12 | 0.5 | NSV-SY-01 | NSV-SY-02 | 47 | 0.4% | RBC2 |
| SY2-110(MFT) | 801 | 15 | 1.0 | NSV-SY-01 | NSV-SY-02 | 35 | 0.7% | RBC2 |
| SY3-110(MFT) | 1335 | 22 | 1.0 | NSV-SY-01 | NSV-SY-02 | 35 | 1.0% | RBC2 |
| SY4-110(MFT) | 3560 | 16 | 1.3 | NSV-SY-01 | NSV-SY-02 | 19 | 1.4% | RBC2 |
| SY5-110(MFT) | 4450 | 22 | 1.5 | NSV-SY-01 | NSV-SY-02 | 17 | 2.2% | RBC2 |
| SY6-110(MFT) | 5785 | 28 | 1.85 | NSV-SY-01 | NSV-SY-02 | 17 | 2.7% | RBC2 |
| SY7-110(MFT) | 8900 | 46 | 3.2 | NSV-SY-03 | NSV-SY-04 | 5 | 15.3% | RBC2 |
| SY8-110(MFT) | 13350 | 46 | 4.0 | NSV-SY-05 | NSV-SY-06 | 15 | 5.1% | RBC32 |
| SY9-110(MFT) | 17800 | 58 | 3.2 | NSV-SY-05 | NSV-SY-06 | 24 | 4.0% | RBC32 |
| SY10-110(MFT) | 22250 | 58 | 4.0 | NSV-SY-05 | NSV-SY-06 | 15 | 6.4% | RBC32 |
| SY11-110(MFT) | 26700 | 58 | 3.0 | NSV-SY-05 | NSV-SY-06 | 25 | 3.9% | RBC32 |
| SY12-110(MFT) | 31150 | 58 | 4.0 | NSV-SY-05 | NSV-SY-06 | 15 | 6.4% | RBC32 |
| SY1-24(P) | 310 | 15 | 1.8 | NSV-SY-11 | NSV-SY-12 | 60 | 0.4% | RBC2 |
| SY2-24(MFT) | 801 | 15 | 3.0 | NSV-SY-11 | NSV-SY-12 | 40 | 0.6% | RBC2 |
| SY3-24(MFT) | 1335 | 22 | 3.0 | NSV-SY-11 | NSV-SY-12 | 40 | 0.9% | RBC2 |
| SY4-24(MFT) | 3560 | 16 | 6.0 | NSV-SY-11 | NSV-SY-12 | 20 | 1.3% | RBC2 |
| SY5-24(MFT) | 4450 | 22 | 6.5 | NSV-SY-11 | NSV-SY-12 | 19 | 1.9% | RBC2 |
| SY1-220(P) | 310 | 12 | 0.3 | NSV-SY-21 | NSV-SY-22 | 42 | 0.5% | RBC2 |
| SY2-220(MFT) | 801 | 15 | 0.5 | NSV-SY-21 | NSV-SY-22 | 36 | 0.7% | RBC2 |
| SY3-220(MFT) | 1335 | 22 | 0.5 | NSV-SY-21 | NSV-SY-22 | 36 | 1.0% | RBC2 |
| SY4-220(MFT) | 3560 | 16 | 0.6 | NSV-SY-21 | NSV-SY-22 | 22 | 1.2% | RBC2 |
| SY5-220(MFT) | 4450 | 22 | 0.7 | NSV-SY-21 | NSV-SY-22 | 19 | 1.9% | RBC2 |
| SY6-220(MFT) | 5785 | 28 | 0.8 | NSV-SY-21 | NSV-SY-22 | 17 | 2.7% | RBC2 |
| SY7-220(MFT) | 8900 | 46 | 1.6 | NSV-SY-23 | NSV-SY-24 | 6 | 12.8% | RBC32 |
| SY8-220(MFT) | 13350 | 46 | 2.0 | NSV-SY-23 | NSV-SY-24 | 4 | 19.2% | RBC32 |
| SY9-220(MFT) | 17800 | 58 | 1.6 | NSV-SY-23 | NSV-SY-24 | 6 | 16.1% | RBC32 |
| SY10-220(MFT) | 22250 | 58 | 2.0 | NSV-SY-25 | NSV-SY-26 | 18 | 5.4% | RBC32 |
| SY11-220(MFT) | 36700 | 58 | 1.6 | NSV-SY-25 | NSV-SY-26 | 26 | 3.7% | RBC32 |
| SY12-220(MFT) | 31150 | 58 | 2.2 | NSV-SY-25 | NSV-SY-26 | 15 | 6.4% | RBC32 |

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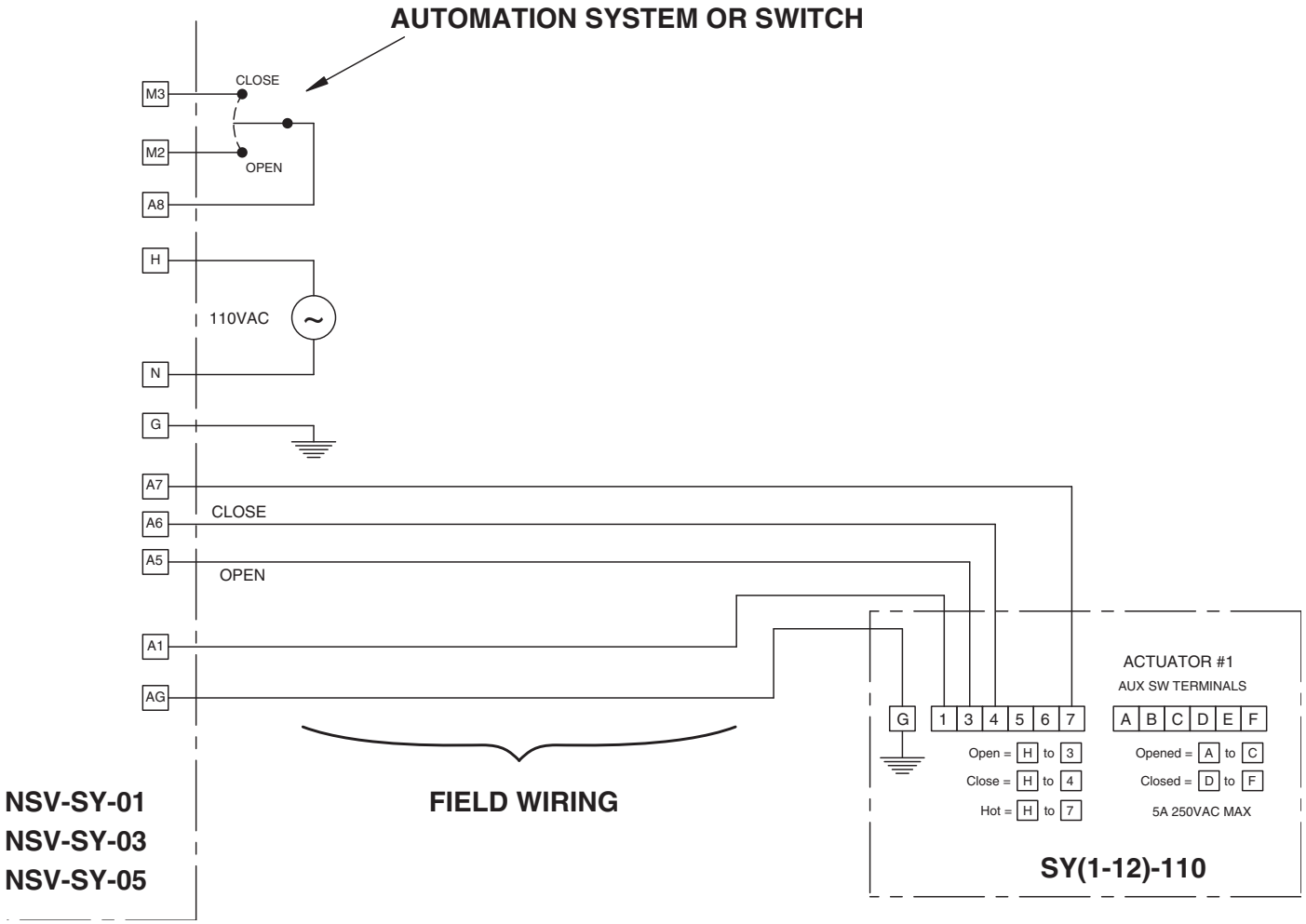


**Wiring diagram for a single on/off SY series 110 VAC actuator.**

Building **mains power** is connected to G, N & H terminals. A control switch or dry contacts are connected between terminal A8 and M2 or M3 to control the positioning of the actuator under power. Terminals AG, A1, A5, A6 & A7 are connected to the SY actuator as shown. Observe wire size rules for longer wire runs.

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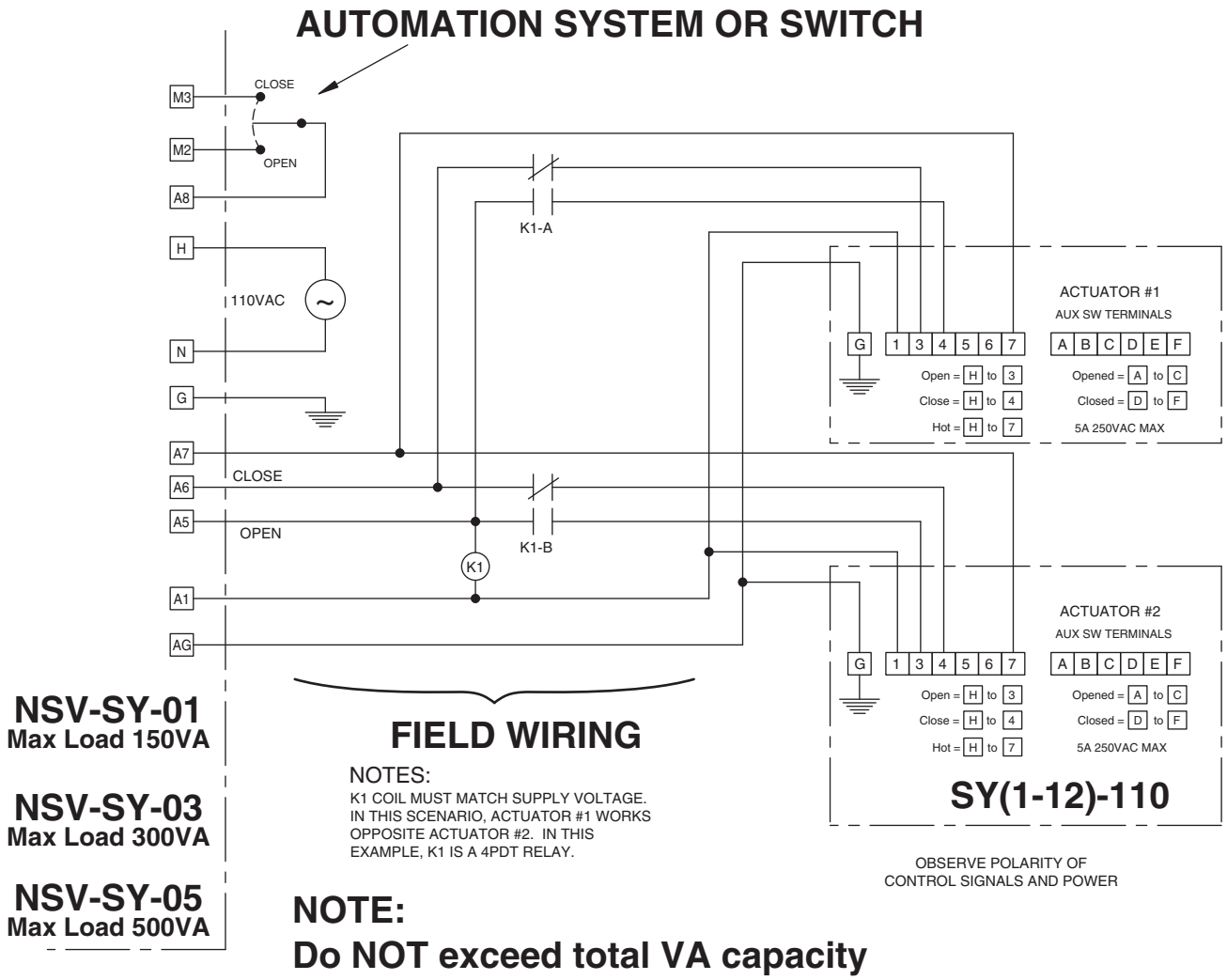


**NOTE:**
**Do NOT exceed total VA capacity of NSV-SY backup system.**

## Wiring diagram for multiple on/off SY series 110 VAC actuators.

**Do NOT exceed the Max Loads as stated above when connecting multiple actuators. Actuators connected in this manner operate in parallel from the common automation control switch and will fail-safe position together.**

Building mains power is connected to G, N & H terminals. A control switch or dry contacts are connected between terminal A8 and M2 or M3 to control the positioning of the actuator under power. Terminals AG, A1, A5, A6 & A7 are connected to the SY actuator as shown. Observe wire size rules for longer wire runs.

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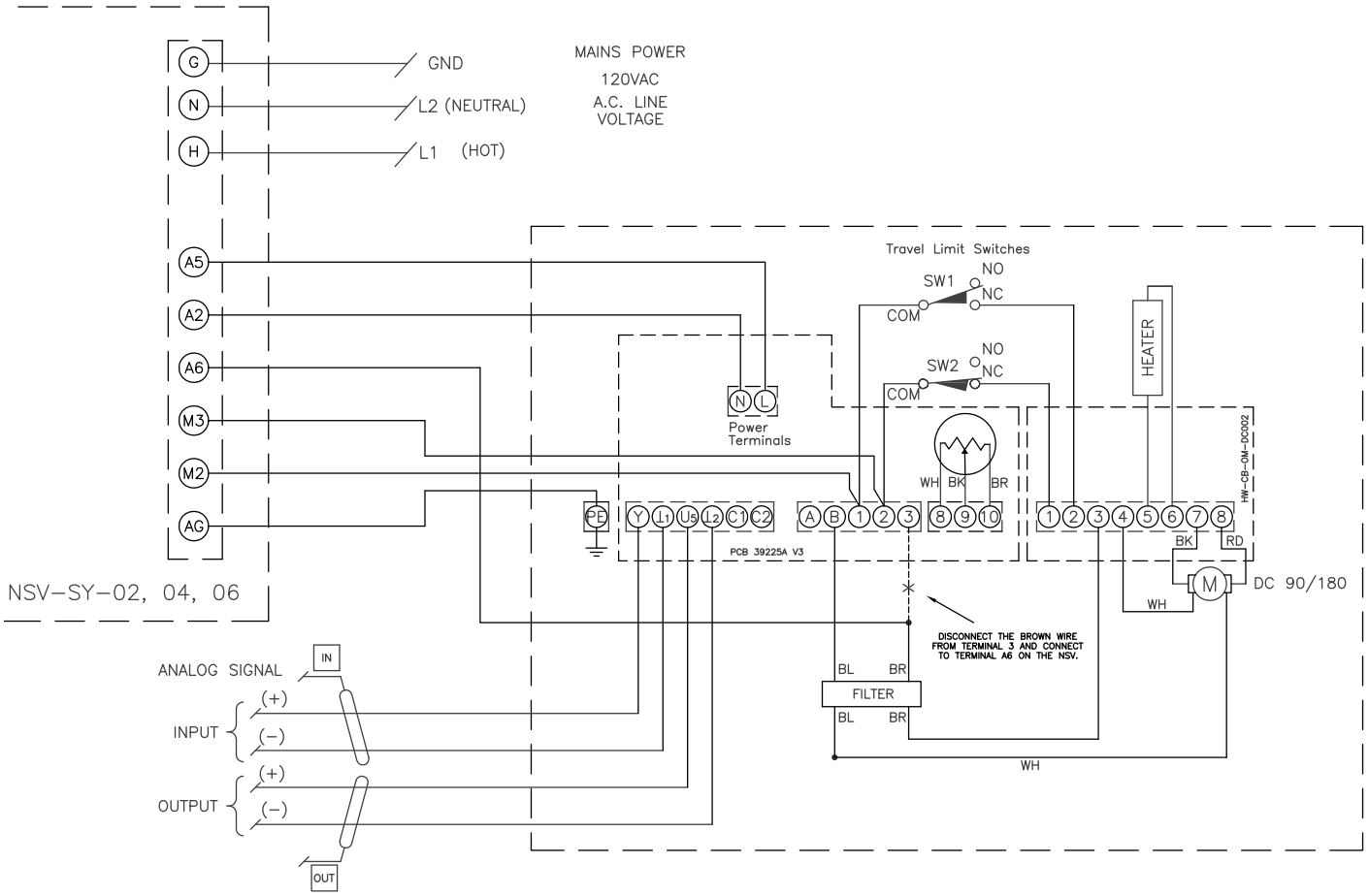
# NSV-SY Battery Back-Up System
# Wiring Diagrams




**Wiring diagram for a single proportional SY series 110 VAC actuator.**

Building **mains power** is connected to G, N & H terminals. The control signal from the automation system is wired directly to the SY actuator. Terminals AG, A2, A5, A6, M2 & M3 are connected to the SY actuator as shown. Observe wire size rules for longer wire runs.

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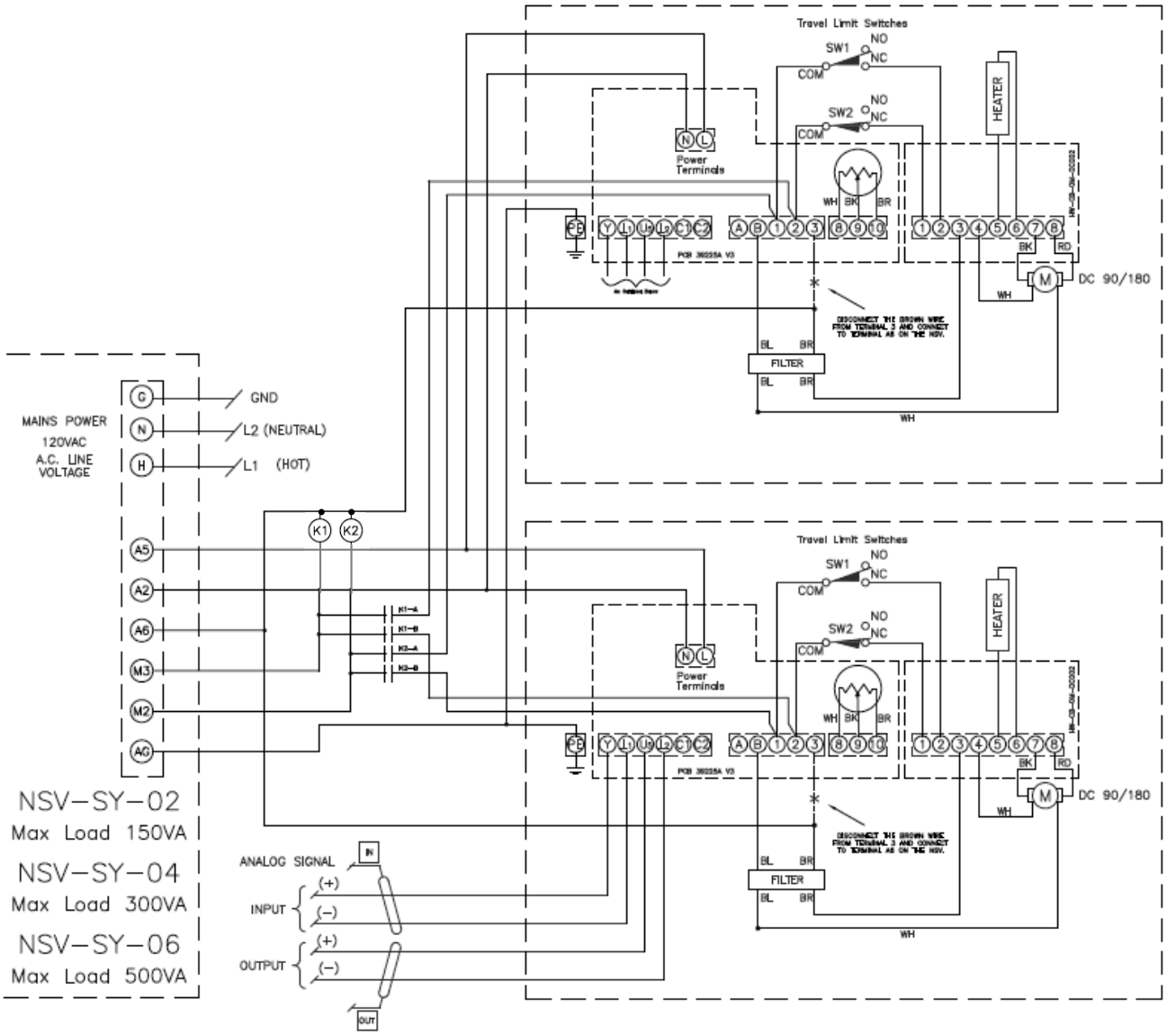


**Wiring diagram for multiple proportional SY series 110 VAC actuators.**

**Do NOT exceed the Max Loads as stated above when connecting multiple actuators. Actuators connected in this manner operate in parallel from the common automation control signal and will fail-safe position together.**

Building **mains power** is connected to G, N & H terminals. The control signal from the automation system is wired directly to the SY actuator. Terminals AG, A2, A5, A6, M2 & M3 are connected to the SY actuators as shown. Observe wire size rules for longer wire runs.

K1 and K2 must be supplied.

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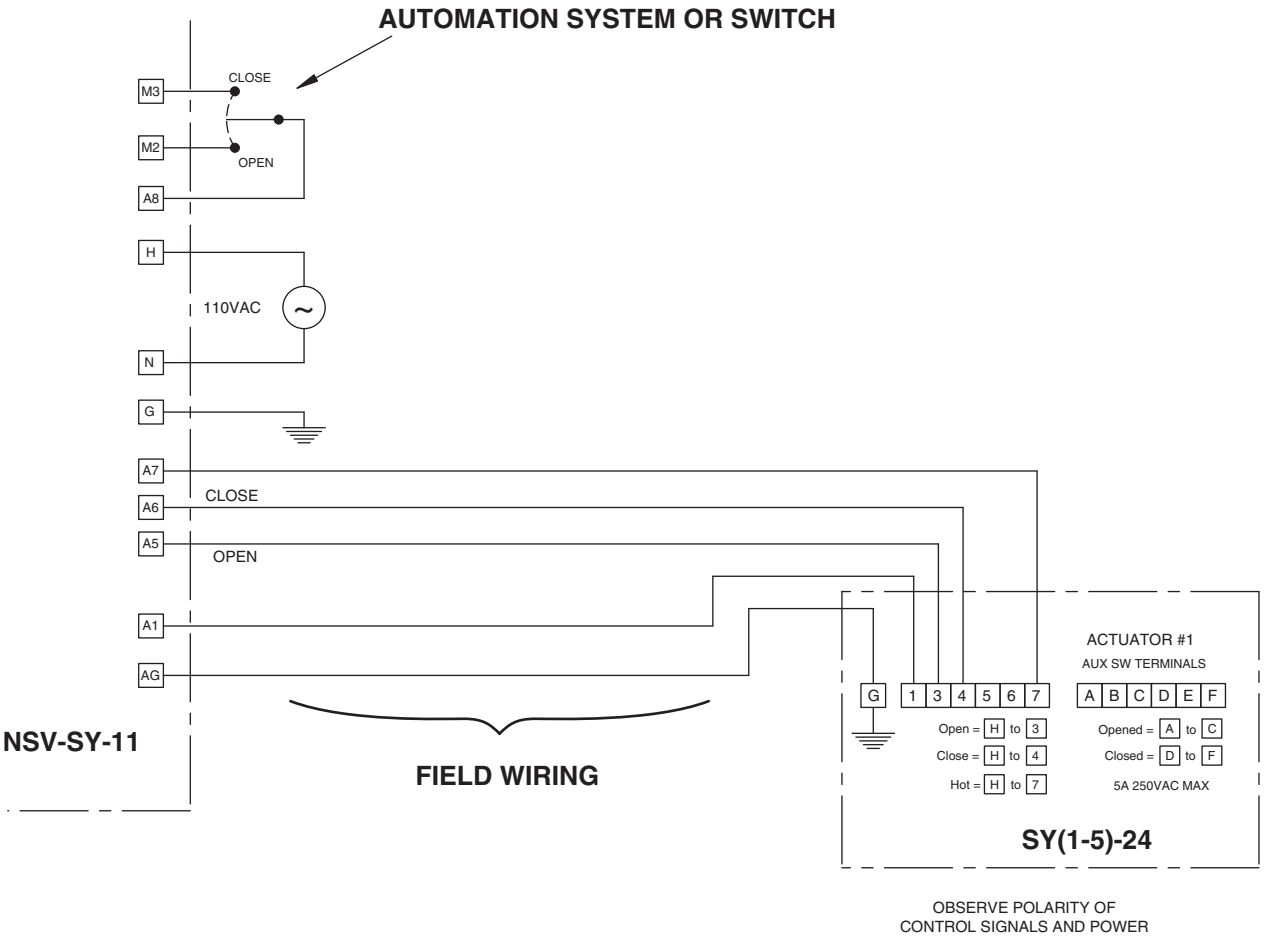


**Wiring diagram for a single on/off SY series 24 VAC actuator.**

Building **mains power** is connected to G, N & H terminals. A control switch or dry contacts are connected between terminal A8 and M2 or M3 to control the positioning of the actuator under power. Terminals AG, A1, A5, A6 & A7 are connected to the SY actuator as shown. Observe wire size rules for longer wire runs. The 24vac transformer required to run the SYxxx-24 actuator is **built in** to the NSV cabinet.

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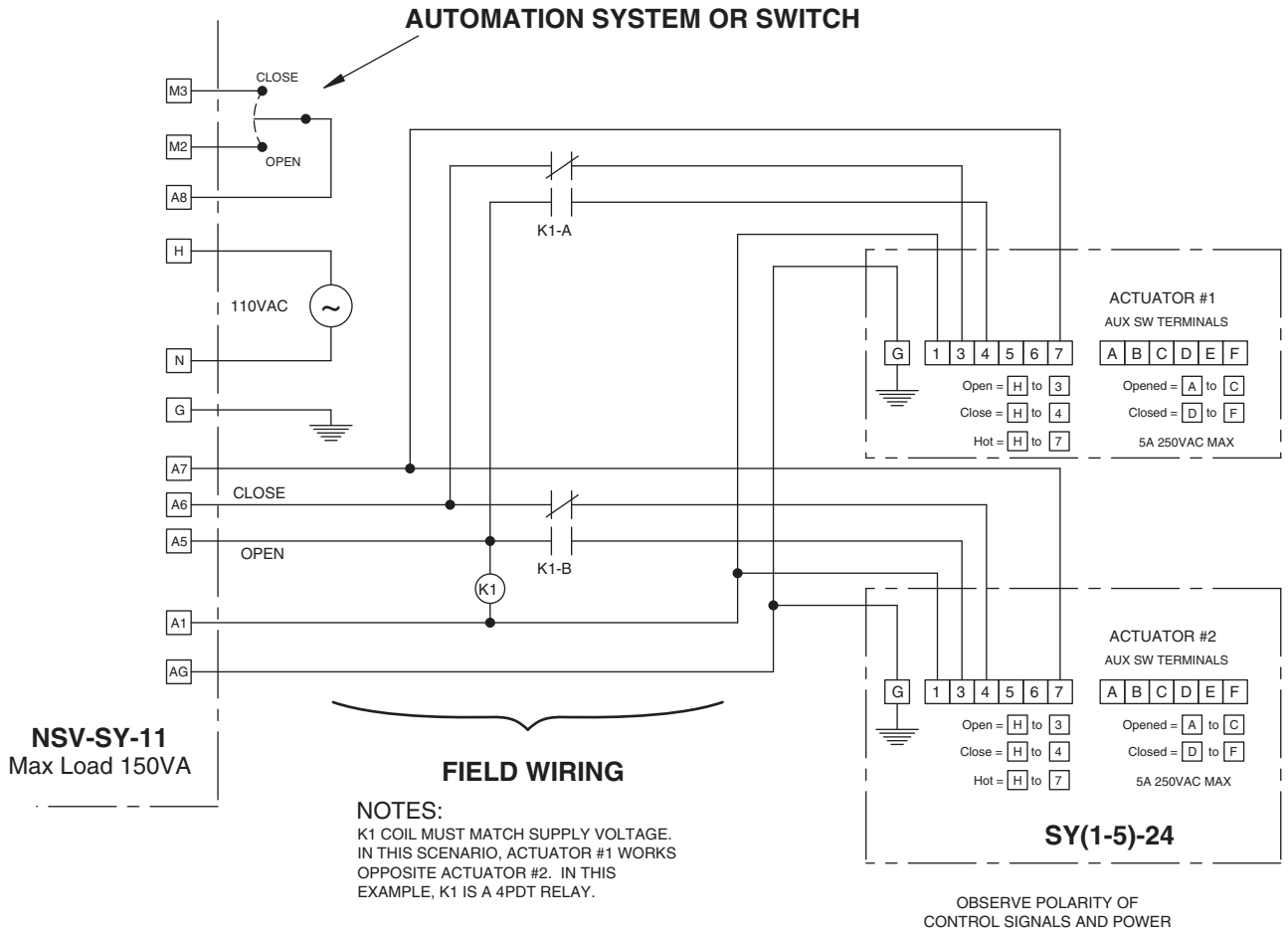


**NOTE:**

**Do NOT exceed total VA capacity**

**of NSV-SY backup system.**

## Wiring diagram for multiple on/off SY series 24 VAC actuators.

**Do NOT exceed the Max Loads as stated above when connecting multiple actuators. Actuators connected in this manner operate in parallel from the common automation control switch and will fail-safe position together.**

Building **mains power** is connected to G, N & H terminals. A control switch or dry contacts are connected between terminal A8 and M2 or M3 to control the positioning of the actuator under power. Terminals AG, A1, A5, A6 & A7 are connected to the SY actuator as shown. Observe wire size rules for longer wire runs. The 24vac transformer required to run the SYxxx-24 actuator is **built in** to the NSV cabinet.

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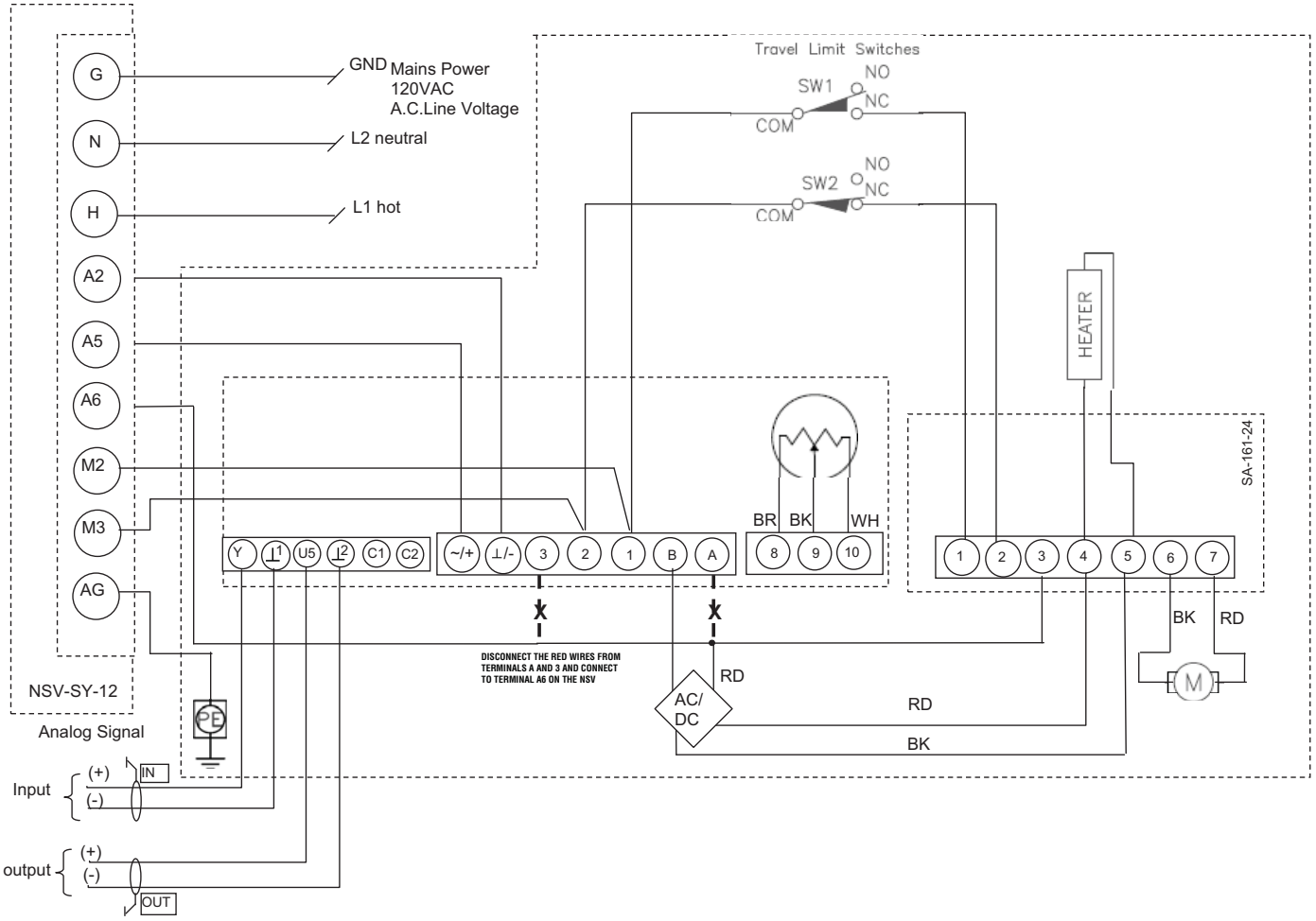


**Wiring diagram for a single proportional SY series 24 VAC actuator.**

Building **mains power** is connected to G, N & H terminals. The control signal from the automation system is wired directly to the SY actuator. Terminals AG, A2, A5, A6, M2 & M3 are connected to the SY actuator as shown. Observe wire size rules for longer wire runs. The 24vac transformer required to run the SYxxx-24 actuator is **built in** to the NSV cabinet.

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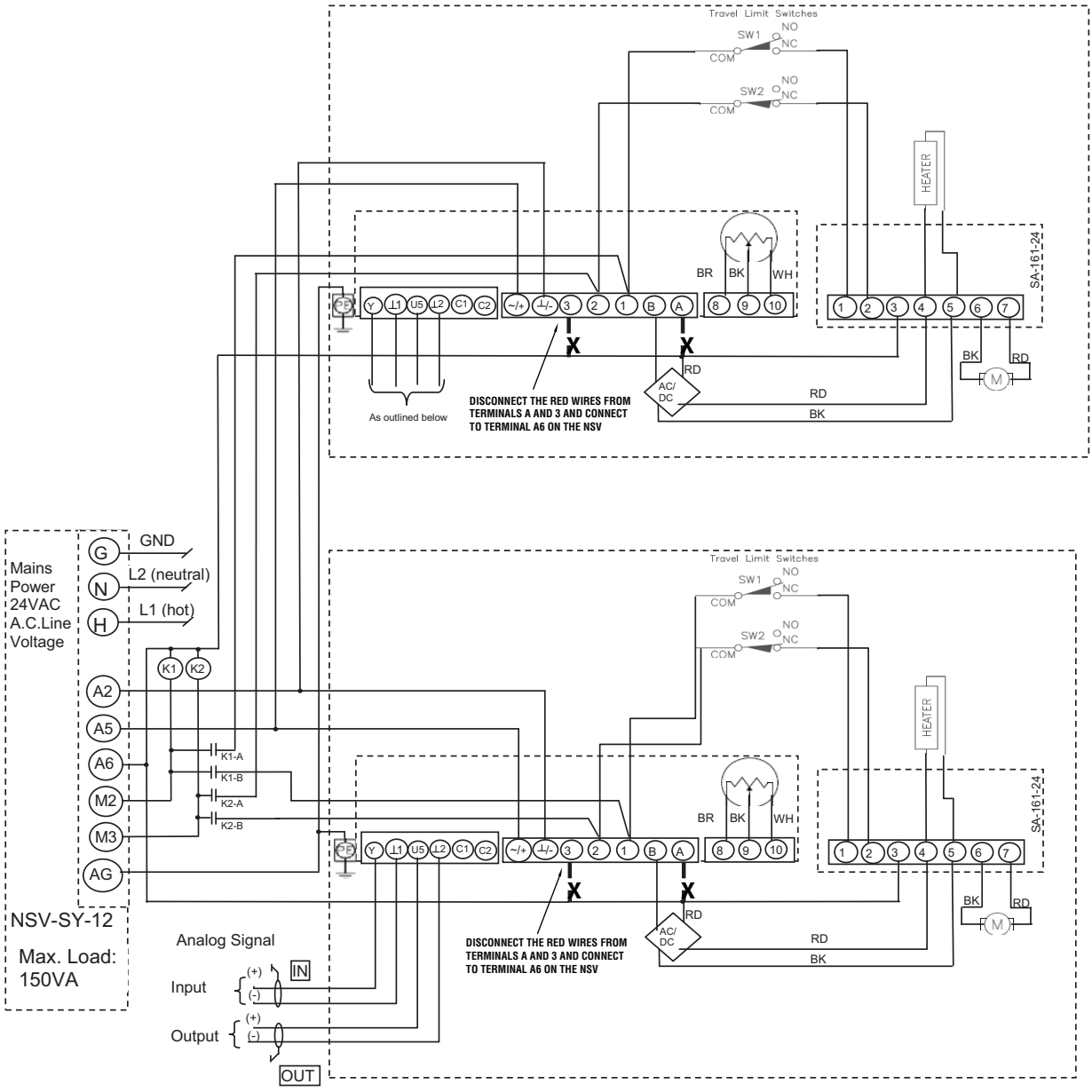


## Wiring diagram for multiple proportional SY series 24 VAC actuators.

**Do NOT exceed the Max Loads as stated above when connecting multiple actuators. Actuators connected in this manner operate in parallel from the common automation control signal and will fail-safe position together.**

Building **mains power** is connected to G, N & H terminals. The control signal from the automation system is wired directly to the SY actuator. Terminals AG, A2, A5, A6, M2 & M3 are connected to the SY actuators as shown. Observe wire size rules for longer wire runs. The 24vac transformer required to run the SYxxx-24 actuator is **built in** to the NSV cabinet.

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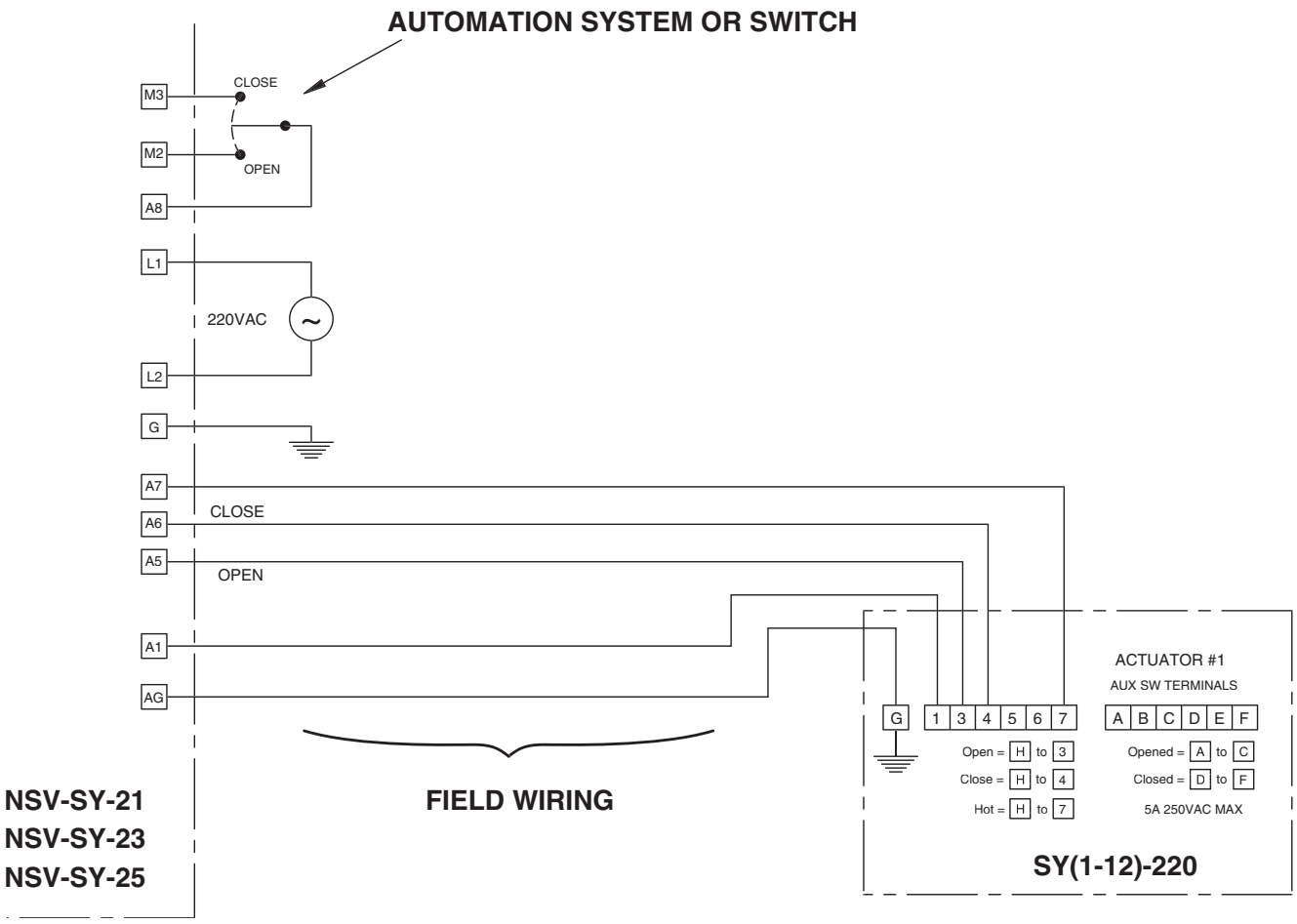


**Wiring diagram for a single on/off SY series 220 VAC actuator.**

Building **mains power** is connected to G, N & H terminals. A control switch or dry contacts are connected between terminal A8 and M2 or M3 to control the positioning of the actuator under power. Terminals AG, A1, A5, A6 & A7 are connected to the SY actuator as shown. Observe wire size rules for longer wire runs.

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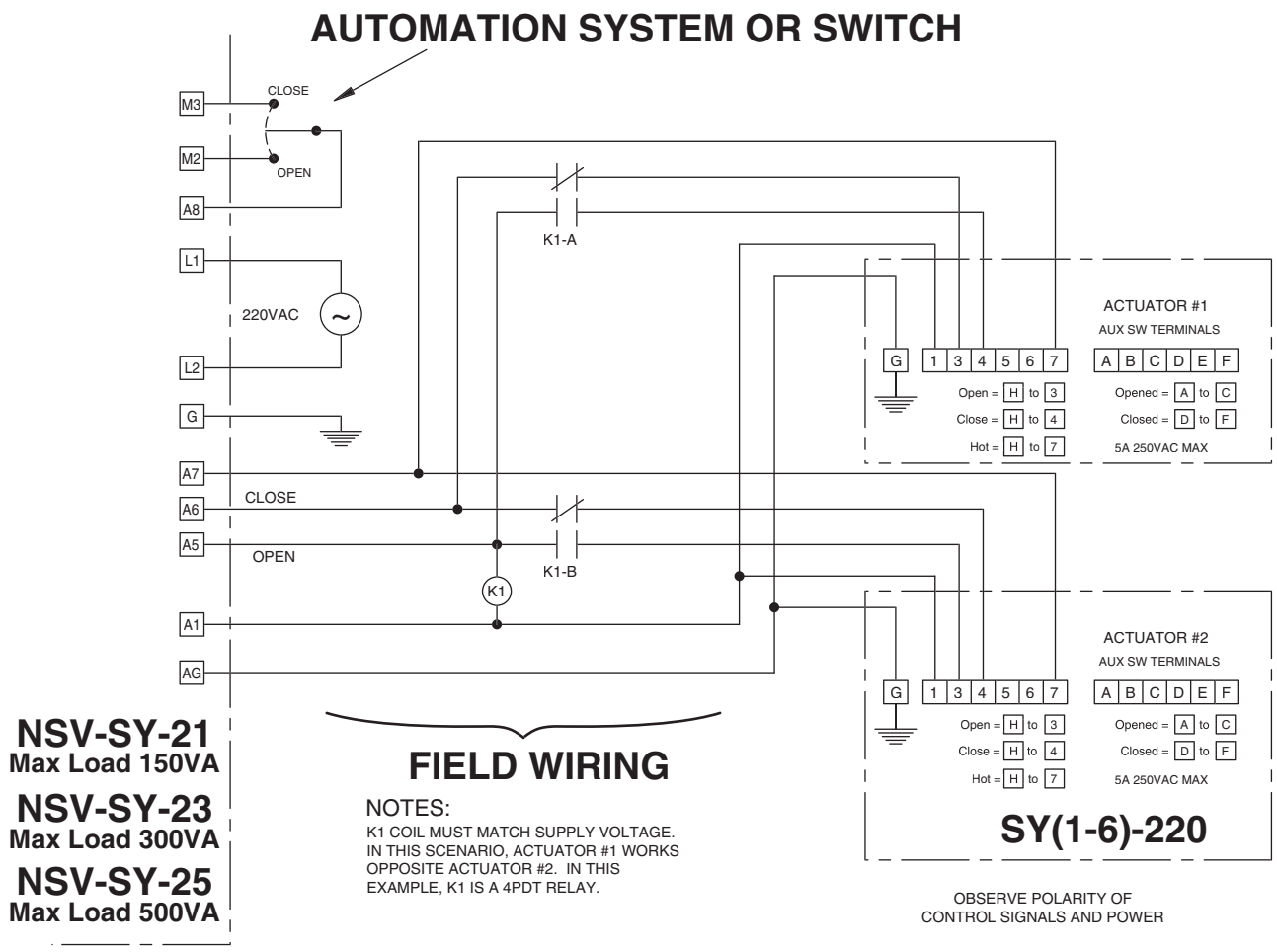


**NOTE:**
**Do NOT exceed total VA capacity of NSV-SY backup system.**

## Wiring diagram for multiple on/off SY series 220 VAC actuators.

**Do NOT exceed the Max Loads as stated above when connecting multiple actuators. Actuators connected in this manner operate in parallel from the common automation control switch and will fail-safe position together.**

Building **mains power** is connected to G, N & H terminals. A control switch or dry contacts are connected between terminal A8 and M2 or M3 to control the positioning of the actuator under power. Terminals AG, A1, A5, A6 & A7 are connected to the SY actuator as shown. Observe wire size rules for longer wire runs.

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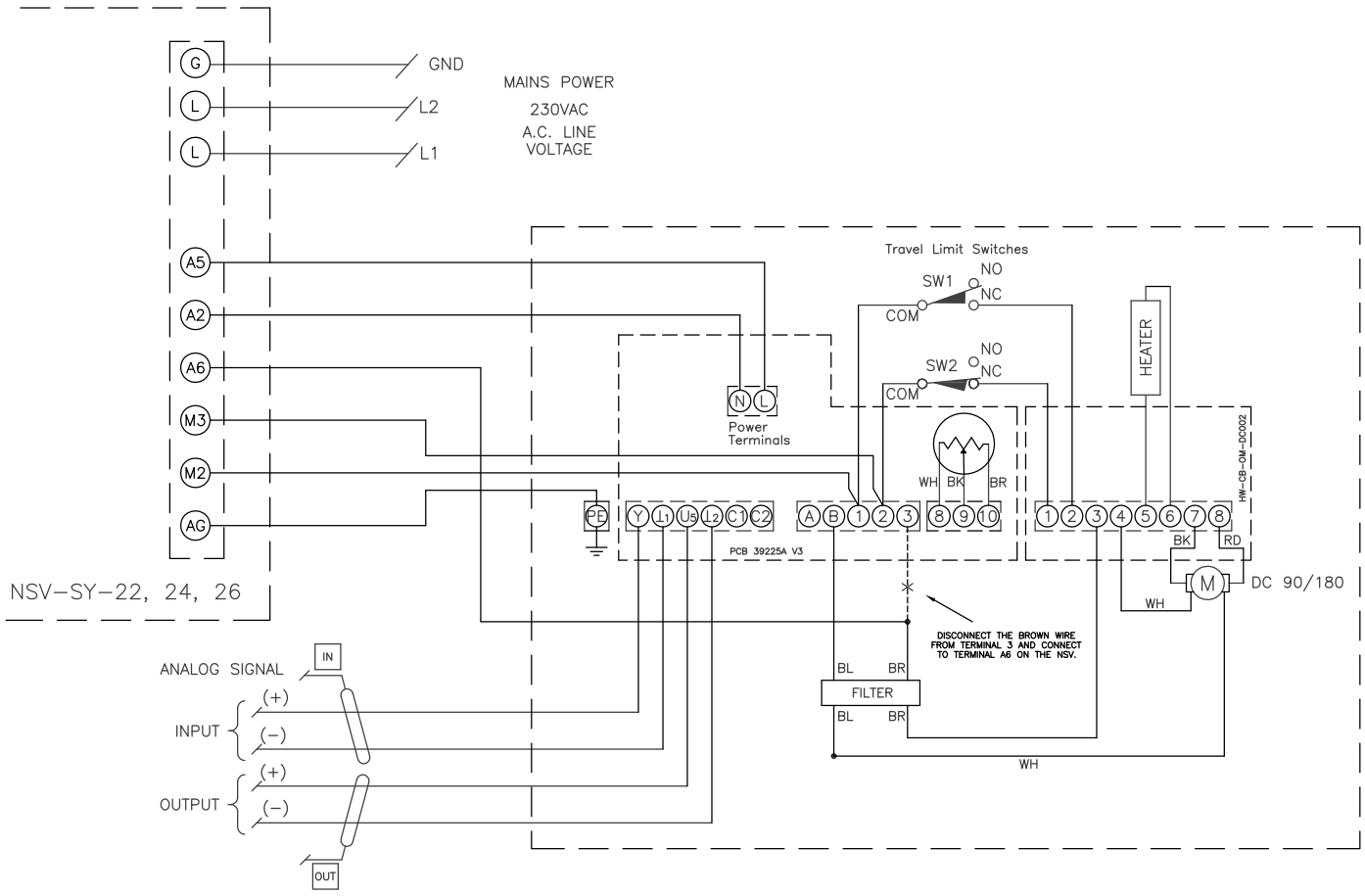


**Wiring diagram for a single proportional SY series 220 VAC actuator.**

Building **mains power** is connected to G, N & H terminals. The control signal from the automation system is wired directly to the SY actuator. Terminals AG, A2, A5, A6, M2 & M3 are connected to the SY actuator as shown. Observe wire size rules for longer wire runs.

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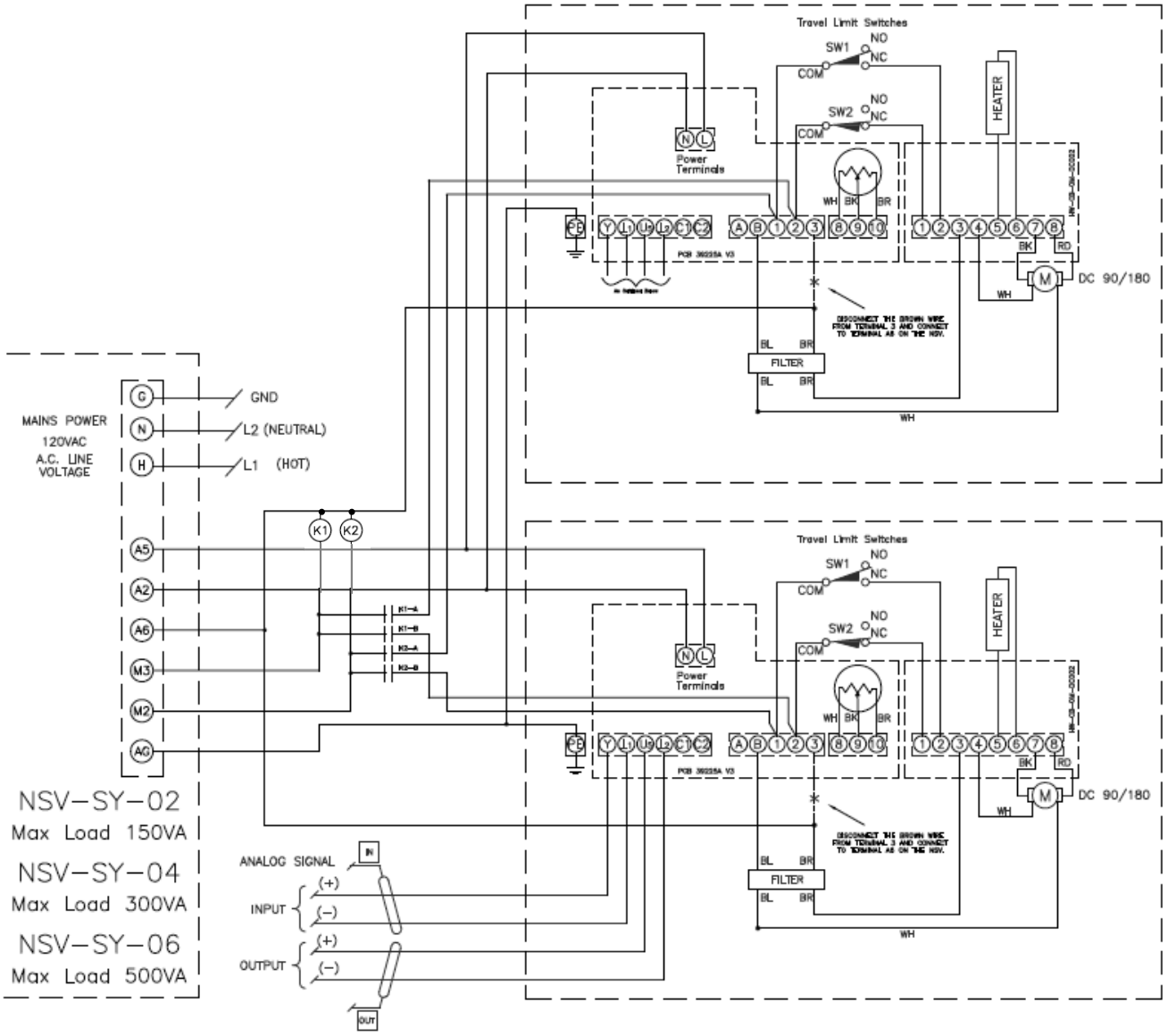


## Wiring diagram for multiple proportional SY series 220 VAC actuators.

**Do NOT exceed the Max Loads as stated above when connecting multiple actuators. Actuators connected in this manner operate in parallel from the common automation control signal and will fail-safe position together.**

Building **mains power** is connected to G, N & H terminals. The control signal from the automation system is wired directly to the SY actuator. Terminals AG, A2, A5, A6, M2 & M3 are connected to the SY actuators as shown. Observe wire size rules for longer wire runs.

K1 and K2 must be supplied.

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# Battery Back-Up System
# For Belimo SY Series Electric Actuators, 2 Position or Modulating

## BACK-UPS CS 350VA/PART NUMBER: BK350
Availability: North America, Latin America

### Product Overview

**Description**
APC Back-UPS, 350VA/210W,
Input 120V/ Output 120V

**General Features**
Addl Surge Protected Outlets, Audible Alarms, Cord Management, Intelligent Battery Management, Internet FAX - modem - DSL protection, Overload Indicator, Replace Batt Indicator, Site wiring fault indicator, Software, User Replaceable batteries

**Documentation**
User Manual

### Technical Specifications

**Input**
Nominal input 120 V
Input frequency 50/60 Hz +/- 5 Hz (auto sensing)
Input Connection Type
NEMA 5-15P
Cord Length 6 feet
Input voltage range for main operations 98 - 140 V

**Output**

Output power capacity 350 VA
Output power capacity 210 Watts
Nominal output voltage 120 V
Waveform type Stepped approximation to a sinewave

Output Connections (3)
NEMA 5-15R (3)
NEMA 5-15R (Surge)

### Batteries

Typical backup time at half load 11.4 minutes
Battery type Maintenance-free sealed Lead-Acid battery with suspended electrolyte: leakproof
Typical recharge time ** 8 hour(s)
Replacement battery cartridge (1) RBC2

### Communications & Management

Control panel LED status display with On Line: On Battery: Replace Battery and Overload indicators
Audible alarm Alarm when on battery: distinctive low battery alarm : overload continuous tone alarm

### Surge Protection and Filtering

Surge energy rating 480 joules
Filtering Full time multi-pole noise filtering: 5% IEEE surge let-through: zero clamping response time: meets UL 1449
Dataline protection RJ-11 Modem/Fax/DSL protection (two wire single line)

## BACK-UPS CS 500VA/PART NUMBER: BK500
Availability: North America, Latin America

### Product Overview

**Description**
APC Back-UPS, 500VA/300W,
Input 120V/ Output 120V

**General Features**
Addl Surge Protected Outlets, Audible Alarms, Cord Management, Intelligent Battery Management, Internet FAX - modem - DSL protection, Overload Indicator, Replace Batt Indicator, Site wiring fault indicator, Software, User Replaceable batteries

**Documentation**
User Manual

### Technical Specifications

**Input**
Nominal input 120 V
Input frequency 50/60 Hz +/- 5 Hz (auto sensing)
Input Connection Type
NEMA 5-15P
Cord Length 6 feet
Input voltage range for main operations 98 - 140 V

**Output**

Output power capacity 500 VA
Output power capacity 300 Watts
Nominal output voltage 120 V
Waveform type Stepped approximation to a sinewave

Output Connections (3)
NEMA 5-15R (3)
NEMA 5-15R (Surge)

### Batteries

Typical backup time at half load 11.4 minutes
Battery type Maintenance-free sealed Lead-Acid battery with suspended electrolyte: leakproof
Typical recharge time ** 8 hour(s)
Replacement battery cartridge (1) RBC2

### Communications & Management

Control panel LED status display with On Line: On Battery: Replace Battery and Overload indicators
Audible alarm Alarm when on battery: distinctive low battery alarm: overload continuous tone alarm

### Surge Protection and Filtering

Surge energy rating 480 joules
Filtering Full time multi-pole noise filtering: 5% IEEE surge let-through: zero clamping response time: meets UL 1449
Dataline protection RJ-11 Modem/Fax/DSL protection (two wire single line)

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## BACK-UPS 900VA/PART NUMBER: BR900

Availability: North America, Latin America

### Product Overview

**Description**

APC Back-UPS, 900VA/540W, Input 120V/ Output 120V

**General Features**

Audible Alarms, Automatic Voltage Regulation (AVR), Easy Overload Recovery, Ethernet Protection, Hot Swap Batteries, Modem Protection, Overload Indicator, Replace Batt Indicator, Site wiring fault indicator, User Replaceable batteries

**Documentation**

User Manual

### Technical Specifications

**Input**

Nominal input voltage 120 V

Input frequency 50/60 Hz +/- 3 Hz (auto sensing)

Input Connection Type NEMA 5-15P

Cord Length 6 feet

Input voltage range for main operations 88 - 139 V

**Output**

Output power capacity 900 VA

Output power capacity 540 Watts

Nominal output voltage 120 V

Waveform type Stepped approximation to a sinewave

Output Connections (7)NEMA 5-15R

### Batteries

Typical backup time at half load 17.6 minutes

Battery type Maintenance-free sealed Lead-Acid battery with suspended electrolyte: leakproof

Typical recharge time ** 8 hour(s)

Replacement battery cartridge (1) RBC32

### Communications & Management

Control panel LED status display with On Line: On Battery: Replace Battery and Overload indicators

Audible alarm Alarm when on battery: distinctive low battery alarm: overload continuous tone alarm

### Surge Protection and Filtering

Surge energy rating 320 joules

Filtering Full time multi-pole noise filtering: 5% IEEE surge let-through: zero clamping response time: meets UL 1449

Dataline protection RJ-11 Modem/Fax/DSL protection (two wire single line) plus RJ-45 ethernet

### PHYSICAL DIMENSIONS

**NSV-SY Series Back-Up Systems**

| Maximum Dimensions | NSV 01, 02 21, 22 | NSV-SY 03, 04, 11 12, 23, 24 | NSV-SY 05, 06 25, 26 |
|---|---|---|---|
| Height | 13 | 13 | 15 |
| Width | 22 | 22 | 22 |
| Depth | 5 | 5 | 5 |
| Net weight | 36# | 42# | 44# |
| Shipping Weight | 38# | 44# | 48# |

### Environmental

Operating Relative Humidity 0 - 95%

Operating Elevation 0-10000 feet (0-3000 m)

Storage Temperature -15 - 45 °C (5 - 113°F)

Storage Relative Humidity 0 - 95%

Storage Elevation 0-50000 feet (0-15000 m)

Audible noise at 1 meter from surface of unit 45 dBA

Online thermal dissipation 24 BTU/hr

### Conformance - APC Back UP Module

Approvals CSA, FCC B, UL 1778

Approvals FCC Part 15 Class B, Industry Canada, UL 1778, cUL Listed

** The time to recharge to 90% of full battery capacity following a discharge to shutdown using a load rated for 1/2 the full load rating of the UPS.

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